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Last 50 Years Of Astronomy

Faintest Naked-Eye Object

Telescope Innovation From Romania

Telescope Innovation: Attila's All-Mirror TCT

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We have here in Arad Romania, an astronomy club called "Galaxis", founded in 1987. One of the co-founders of our club is Attila Csillag. He loves to create "space-art" paintings, to build strange looking bicycles and to make telescopes.

I always knew that a telescope is made of an objective (simple lens, doublet, triplet, a single mirror, a compound of two, three, four mirrors) and an eyepiece. The eyepiece, at its turn, consisted first of a concave/negative lens, then a convex/positive lens, then two simple lenses, then three, four, five...(and so on) lenses. But the eyepieces I heard of, were made always of lenses.

In March 2008, my friend Attila introduced to me his latest born telescope. And to my surprise, this is a "catoptric telescope" meaning an "all-mirror telescope". You can see in the picture, Attila showing his catoptric telescope.

Basically Attila's telescope is an oblique reflector, known as a Herschelian, "front-view", Zucchi, Lahirean, Lomonosov telescope, in which instead of using a "normal" refracting eyepiece, it uses a reflective eyepiece made of a small, tilted concave mirror.

For an object situated at infinity, the separation of the mirrors is equal to the sum of their foci, the image is magnified M times = F/f , where " F " is the focus of the primary mirror and " f " is the focal length of the eyepiece-mirror.

The telescope in the picture is a prototype, having a primary of 72mm aperture at $F/10$. The eyepiece-mirror is actually a positive meniscus lens of 30mm aperture and 70mm focal length. The concave face of this small meniscus lens was aluminized to become a concave/positive mirror. The magnification of this telescope is 10x.

Latter that year, I did some observations and I found that the effective visual field of the telescope is about twice the diameter of the Moon, so one degree. This means that the apparent field of view of the eyepiece-mirror is about ten degrees.

On October 10 2008, from an urban observing site, the First Quarter Moon was nice; I had a look to brilliant stars like Alpha Cyg, Vega, Altair, the Double-Double star in Lyra (seen only as a double star) and the rich stellar fields in Cygnus. Because the eyepiece-mirror has only collimation screws, you must move your head along the tube to find the position of the final image and the telescope was hand-held.

Together we derived some ideas to improve Attila's telescope:

- a focusing device to move the eyepiece-mirror, scrounged from an out-of-service binocular will help
- another device is required to position the eye of the observer, (a baffle cut in a piece of tin?). A rubber eyecup glued to this will protect against stray light.
- shade to cover and protect the eyepiece-mirror is necessary
- also it is hard to point the telescope because it is a TCT, so some sort of finder is required.



Attila's All-Mirror TCT Telescope

And like any telescope, it will be beneficial to use it on a mount, not hand-held.

Of course using stigmatic mirrors, similar to a Yolo secondary mirror, would be the key to obtain aberration-free images, but we don't have anybody in the club able to grind them. Yet...

Attila's telescope is mentioned on the Stellafane website under [Unobstructed telescopes/Other designs](#). This is a great honour for our astronomy club.

I wish clear skies to all of you.